The Family Columbellidae in the Western Atlantic
Part IIa. - The Pyreninae

BY

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(4 Plates)

INTRODUCTION

As noted in the first article of this series (Radwin, 1977), the family Columbellidae is a large cosmopolitan family of small buccinacean gastropods which, since an apparent Eocene origin, have undergone considerable adaptive radiation. The family may be divided into 2 unequal sized subfamilies on the bases of radular dentition and, to a lesser extent, shell morphology (Radwin, *op. cit.*). In Part I most of what is known concerning the phylogeny, ecology, and zoogeography of the family was reported, together with a systematic treatment of the genera and species assignable to the subfamily Columbellinae, the smaller of the 2 columbellid subfamilies. The present contribution continues the systematic treatment, covering the genera *Anachis* H. & A. Adams, 1853; *Costoanachis* Sacco, 1890; *Metulella* Gabb, 1873; *Nassarina* Dall, 1889; *Parvanachis* Radwin, 1968; and *Steironepion* Pilsbry & Lowe, 1932 of the subfamily Pyreninae. A total of at least 22 western Atlantic species is assignable to these genera. Another portion, Part IIb, is projected, which will cover the remaining 9 genera and their complement of at least 17 species in the region.

ACKNOWLEDGMENTS

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I would like to acknowledge my appreciation to Dr. Harald A. Rehder under whose direction this research was done; to Drs. Joseph Rosewater, Joseph P. E. Morrison, and Wendell P. Woodring, who contributed critical suggestions. Dr. Norman Tebble, formerly of the British Museum (Natural History) and Mr. Jack Scott and the staff of the Photographic Laboratory, National Museum of Natural History, Washington, D. C., supplied photographs of specimens. Mr. Anthony D'Attilio, San Diego Natural History Museum re-illustrated the radulae. Thanks are also due to Drs. Kenneth J. Boss, Museum of Comparative Zoology, William K. Emerson, American Museum of Natural History, and R. Tucker Abbott, (formerly of the Academy of Natural Sciences, Philadelphia), for permitting me to examine the mollusk collections of their respective institutions. In addition, I offer thanks to all individuals, too many to enumerate, who have helped me obtain additional specimens for study. The present research was carried out under a Smithsonian Predoctoral Internship.

Standard abbreviations for museums may be found in part I of this series (The Veliger 19 (4): 409 - 410).

Pyreninae Suter, 1913

Shell small to moderately large (2 - 40mm), fusiform or subfusiform; spire generally high and acute, spire whorls flat to convex in profile, suture varying from very shallow (*Mitrella*), to impressed (*Amphissa*) or incised (*Suturoglypta*); body whorl varying from large and broad (*Cosmioconcha*) to small and slender (*Steironepion*), apertural lip generally denticulate on inner surface, columella either denticulate or smooth; siphonal canal short (*Aesopus*) to moderately long (*Metulella*). Sculpture variable, including axial elements, with or without spiral elements of variable strength. Each radular row with a flat, subrectangular median tooth, not as broad as typical for the Columbellinae, and devoid of cusps and denticles (Figures A3, A4). Median tooth flanked on each side by a single sigmoid, bi- or tricuspid lateral tooth, narrower than that typical for the Columbellinae.

Type genus: *Pyrene* Röding, 1798.

Anachis H. & A. Adams, 1853

Columbella (Anachis) H. & A. Adams, 1853. Gen. Rec. Moll.: 184
Anachis H. & A. Adams. Mörch, 1852. Cat. Conch. ... Yoldi: 254

Type species by SD (Tate, 1868: 13), *Columbella scalarina* Sowerby, 1832 (Figure *24*).
Shell moderate-sized to large (10 - 25 mm in length), and broadly fusiform; spire moderately high and acute, whorls convex, suture distinct, not generally impressed; body whorl ½ the total shell length, heavy, shouldered, aperture wide, siphonal canal short; sculpture consisting of prominent axial ribs. Color pattern of 1 or 2 spiral bands of white on brown or the reverse. Each radular row consists of a single flat, subrectangular median tooth flanked on each side by a sigmoid, distally bicuspid lateral tooth (Figure *29*).

Remarks: Tate's selection of *Columbella scalarina* as the type species of *Anachis* limited the concept of the genus (*s. s.*) to a small number of relatively large species with strong axial ribbing and a prominently shouldered body whorl. Many species previously assigned to *Anachis* are more properly assigned to *Costoanachis* Sacco, 1890, as they are smaller, their axial ribbing is neither as strong nor as consistent and they lack the thickened, shouldered body whorl.

Anachis lyrata (Sowerby, 1832)

(Figure *1*)

Columbella lyrata Sowerby, 1832. Proc. Zool. Soc. London 2: 114 (Panamá Bay, Panamá; lectotype, BM(NH) 1966320)
Colombella veleda Duclos, 1846. Illust. Conchyl., plt. 7, figs. 19-20 (type locality here designated as Boa Viagem, Brazil; representation of lectotype, Duclos, 1846, Illust. Conch. 4: plt. 7, figs. 19-20)

Shell moderately large (14 - 20 mm in length), and heavy; spire high and acute, whorls slightly shouldered, and somewhat convex, suture impressed; body whorl large and broad, aperture moderately wide, apertural lip thickened and denticulate within, columella straight and denticulate, siphonal canal very short, anal groove present; sculpture of strong axial ribs; color ivory with 1 or 2 spiral rows of brown spots on the axial ribs. Each radular row consists of a flat, subrectangular median tooth, flanked on each side by a single, bicuspid lateral tooth (Figure *30*).

Remarks: Originally described from the Panamic-Pacific province of Central and South America, specimens of this species from the Atlantic coast of South America are indistinguishable from Pacific examples.

This is the only Recent species of *Anachis s. s.* occurring in the western Atlantic. Empty and worn shells of *A. terpsichore*, an Indo-Pacific species have been collected in the Caribbean. These appear to be adventitious ballast records. No fossil record has been found for this species, although its Recent amphi-American distribution would suggest a substantial ancestry.

Western Atlantic Range: Cuba and Central America to Santa Catharina, Brazil (also inhabits the tropical eastern Pacific).

Costoanachis Sacco, 1890

Costoanachis Sacco, 1890 (*in* Bellardi) Mem. Reale Accad. Sci. Torino 6: 57 (type species by SD [Pace, 1902, 5 (1/2): 43] *Columbella (Anachis) turrita* Sacco, 1890, not Sowerby, 1832 (= *Costoanachis saccostata* nom. nov.). (see Figure *2*)

Shell small to moderate in size (4 - 15 mm in length), and fusiform; spire moderately high, acute, whorls flat to convex, suture shallow to incised or impressed; body whorl equal to or less than ½ total shell length, aperture moderately wide, outer apertural lip generally denticulate within; columella straight, weakly denticulate, siphonal canal short and straight; sculpture of prominent axial ribs, in some cases limited to the body whorl, commonly with sub-

Explanation of Figures *1* to *14*

Figure *1*: *Anachis lyrata* (Sowerby, 1832)
Figure *2*: *Anachis turrita* Sacco, 1890 (*Costoanachis saccostata* nom. nov.)
Figure *3*: *Costoanachis avara* (Say, 1822)
Figure *4*: *Costoanachis hotessieriana* (Orbigny, 1842)
Figure *5*: *Costoanachis lafresnayi* (Fischer & Bernardi, 1856)
Figure *6*: *Costoanachis lafresnayi* (Fischer & Bernardi, 1856)
Figure *7*: *Costoanachis floridana* (Rehder, 1939)
Figure *8*: *Costoanachis hotessieriana* (Orbigny, 1842)
Figure *9*: *Costoanachis hotessieriana* (Orbigny, 1842)
Figure *10*: *Costoanachis sparsa* (Reeve, 1859)
Figure *11*: *Costoanachis scutulata* (Reeve, 1859)
Figure *12*: *Costoanachis catenata* (Sowerby, 1844)
Figure *13*: *Costoanachis sertularium* (Orbigny, 1839)
Figure *14*: *Costoanachis semiplicata* (Stearns, 1873)

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

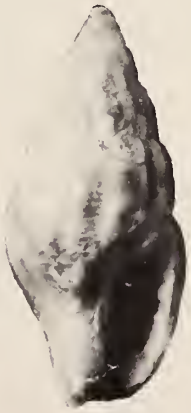

Figure 11

Figure 12

Figure 13

Figure 14

microscopic spiral grooves between them. Color variable. Each radular row consists of a flat, subrectangular median tooth flanked on each side by a single bi- or tricuspid lateral tooth. These are shorter and more strongly bent than those of *Anachis s. s.*

Remarks: Sacco, in his extremely brief description ("all whorls axially ribbed (except for *C. corrugata* Brocchi)"), apparently did not intend to limit this name to only those species with axial sculpture on every whorl. With the expansion of the original description to include partially ribbed forms, many species previously assigned to *Anachis* but differing from the type species of that genus may now be assigned to *Costoanachis* (*e.g.*, *"A." avara, "A."sertularium, "A." catenata*).

Gardner (1948) and Olsson & Harbison (1953) tacitly accepted this wider interpretation of *Costoanachis* without offering a verbal expansion of the original definition. These authors placed *Anachis obesa* here, an assignment which appears to be incorrect. *Parvanachis* Radwin, 1968 was erected for the group of very small, squat, ribbed, *Anachis*-like forms with ventricose apertural lips, typefied *by A. obesa.*

A new name for *Columbella (Anachis) turrita* Sacco, 1890 is needed, as this name is preoccupied by *Columbella turrita* Sowerby, 1832 (at present assigned to *Strombina*). *Costoanachis saccostata* Radwin, nom. nov. is introduced herein as a replacement.

Costoanachis avara (Say, 1822)

(Figure *3*)

Colombella avara Say, 1822. Journ. Acad. Nat. Sci. Phila. 2: 230 (type locality restricted by Scheltema (1968) to "Florida"; lectotype ANSP 16887)

Colombella cleta Duclos, 1846 (*in* Chenu) Illust. Conchyl. plt. 15, figs. 13, 14 (type locality not specified; representation of lectotype, Duclos, 1846, 4: plt. 15, figs. 13, 14)

Anachis avara (Say). Dall, 1889b. Bull. U. S. Nat. Mus. 37: 116

Shell moderate in size (10 - 20mm in length); spire slightly greater than ½ shell length, whorls convex, suture shallow; body whorl cylindrical, moderately broad, aperture moderately wide, apertural lip slightly thickened, weakly denticulate interiorly, columella straight, nondenticulate; siphonal canal short and straight; sculpture of widely spaced ribs on the body whorl only, all other whorls smooth. Color pattern of irregular brown blotches on a white background. Each row consists of a flat, rectangular median tooth flanked on each side by a single sigmoid, bicuspid lateral tooth (Figure *31*).

Remarks: This species is certainly one of the most common shallow-water columbellids on the U. S. Atlantic coast. It is often confused with *Costoanachis lafresnayi* (= *C. translirata*), another east coast columbellid. *Costoanachis avara* is easily distinguished from *C. lafresnayi* by its lack of all sculpture on all whorls but the last one and by the convexity of its whorls; *C. lafresnayi has* flat-sided completely sculptured spire whorls.

Costoanachis avara has been reported from as far south as Brazil and Argentina (Pilsbry, 1898; Eyerdam, 1950). These reports probably refer to *C. sertulariarum* Orbigny, a related South American species lacking spire sculpture. *Costoanachis avara* differs from *C. sertulariarum* in its larger apical angle, its more convex whorls, and its more impressed suture.

No fossil examples of this species have been reported.

Range: The Gulf of Maine to Miami, Florida on the eastern coast of the United States of America.

Costoanachis catenata (Sowerby, 1844)

(Figure *12*)

Columbella catenata Sowerby, 1844. Proc. Zool. Soc. London **12:** 52 (here restricted to Montego Bay, Jamaica; representation of lectotype, Sowerby, 1847, sp. 94, fig 171)

The location of the holotype is unknown. Originally part of the Cuming Collection, the type is not to be found at the British Museum (Natural History) where the Cuming Collection was deposited. Some small parts of the Cuming Collection were sold prior to its acquisition by the BM(NH). This type was apparently in one of those parts.

Shell small (4- 7mm in length); spire slightly over ½ total shell length, whorls convex, distinctly shouldered, with impressed suture; body whorl cylindrical, apertural lip strongly denticulate within, columella strongly denticulate, bent at its anterior end, siphonal canal short and bent; sculpture of strong, sharply cut axial ribs with weak intercostal spiral grooves and a single strong subsutural spiral groove; color white with spiral bands of brown or orange "chain-links." Protoconch 2 swollen, translucent-white whorls. The radula of *Costoanachis catenata* was not examined, as none of the specimens examined had been collected alive.

Remarks: This species has been confused with *Costoanachis sparsa* and *C. scutulata* where their ranges overlap in Bermuda. However, the strongly denticulate apertural lip and columella, the strongly bent columella and siphonal canal, the striking patterns of color and sculp-

ture, and a rather distinctive bulbous protoconch serve to distinguish *C. catenata* from these 2 congeners.

No fossil specimens of this species have been reported.

Range: Bermuda and southern Florida to Colón, Panama and Bahía, Brazil.

Costoanachis fenneli Radwin, 1968

(Figure *15*)

Costoanachis fenneli Radwin, 1968. Proc. Biol Soc. Wash. 81: 147 (Sacco São Francisco, Guanabára, Brazil; holotype, USNM 539122)

Shell small (5 - 7 mm in length); spire acute, slightly more than ½ total shell length, spire whorls slightly convex, suture weakly impressed; body whorl expanded, angular, asymmetrical, left side slightly more expanded than right, outer apertural lip denticulate within, anal sinus strong, columella straight, weakly denticulate; sculpture of strong axial ribs, crossed by fine shallow, spiral grooves; yellowish-white ground color with anastomosing brown blotches; protoconch of almost 3 full, glassy brown whorls. Each radular row consists of a flat subrectangular median tooth flanked on each side by a single sigmoid, bicuspid lateral tooth (Figure *32*).

Remarks: This species is known from a single lot of 35 specimens, collected alive by Dr. Doris Cochrane near Nictheroy, Guanabára State, Brazil in April 1935. Its large, angulate body whorl, prominent axial and distinctive spiral sculpture, color pattern and multiwhorl protoconch distinguish this species from all others.

No fossil examples have been reported.

Known to me only from the type locality, Sacco São Francisco, Guanabára, Brazil.

Costoanachis floridana (Rehder, 1939)

(Figure *7*)

Anachis floridana Rehder, 1939. The Nautilus 53 (1): 20-21; plt. 6 (near Cape Canaveral, Brevard County, Florida; holotype, USNM 473202)

Shell small (6 - 12 mm in length); spire ½ total shell length, whorls slightly convex, suture shallow; body whorl cylindrical and moderately wide, apertural lip slightly thickened, distinctly denticulate within, columella straight, weakly denticulate; sculpture of low, widely spaced axial ribs on only the last 2 whorls, disappearing below the periphery. There are also numerous microscopic spiral lines over the entire adult shell; color pale yellow with irregular blotches of purplish brown. Each radular row consists of a rectangular median tooth flanked on each side by a single sigmoid tricuspid lateral tooth. The 3 cusps of the lateral teeth are very long and strongly curved (Figure *35*).

Remarks: Considered a variety of *Costoanachis avara* by some, *C. floridana* actually appears more closely related, on the basis of the radula and certain shell characters, to *C. sertulariarum*. It may be separated from that species on the basis of geographic distribution (southern Florida vs. Brazil), its smaller size, more convex spire profile, slight differences in lateral radular dentition and presence of microscopic shell sculpture.

Rehder (1939) in his original description of this species states that it differs from *Costoanachis avara* in "lacking the spiral grooves of that species." The holotype of *C. floridana* has distinct spiral sculpture. Although the catalog number and dimensions in the original description agree with those of the labeled holotype, Rehder states that the holotype was collected in Brevard County near Cape Canaveral, Florida. The locality listed with the holotype in the USNM type collection is near S. Jetty, St. John's Bar, Mayport, Duval Co., Fla. This confusion apparently arose because of a mixup in labeling. A lot of *Parvanachis obesa* with a label giving the published type locality of *C. floridana* has been found in the USNM collection.

No fossil examples of this species have been reported.

Range: Off Beaufort, North Carolina to Dade County,

Explanation of Figures *15* to *28*

Figure *15*: *Costoanachis fenneli* Radwin, 1968
Figure *16*: *Steironepion monilifera* (Sowerby, 1844)
Figure *17*: *Steironepion minor* (C. B. Adams, 1845)
Figure *18*: *Anachis scalarina*
Figure *19*: *Metulella columbellata* (Dall, 1889)
Figure 20: *Nassarina bushii* (Dall, 1889)
Figure *21*: *Nassarina metabrunnea* Dall & Simpson, 1901
Figure *22*: *Parvanachis rhodae* (Radwin, 1968)
Figure *23*: *Nassarina glypta* (Bush, 1885)
Figure *24*: *Parvanachis isabellei* (Orbigny, 1839)
Figure *25*: *Parvanachis isabellei* (Orbigny, 1839)
Figure *26*: *Parvanachis obesa* (C. B. Adams, 1845)
Figure *27*: *Parvanachis ostreicola* (Sowerby, 1885)
Figure *28*: *Parvanachis melvillei* (Strebel, 1905)

Figure 15

Figure 16

Figure 17

Figure 18

Figure 19

Figure 20

Figure 21

Figure 22

Figure 23

Figure 24

Figure 25a

Figure 25

Figure 26

Figure 27

Figure 28

Florida, and from Carancahua Bay, Texas to Brownsville, Texas.

Costoanachis lafresnayi (Fischer & Bernardi, 1856)

(Figures *5*, *6*)

Columbella lafresnayi Fisher & Bernardi, 1856. Journ. de Conchyl. 5: 357; plt. 12, figs. 4, 5 (Guadeloupe; holotype, CJC)

Columbella ocellata Reeve, 1859 (not Gmelin, 1791). Conch. Icon., *Columbella*, plt. 37 , fig. 237 (type locality not specified; holotype, BM[NH]

Columbella translirata Ravenel, 1861. Proc. Acad. Nat. Sci. Philadelphia 3: 41-42 (off Charleston, South Carolina; holotype apparently destroyed)

Columbella (Anachis) avara Kobelt, 1897 (not Say, 1822). (*in*) Martini & Chemnitz, Conchyl. Cabinet 3-Id: 62; plt. 8, figs. 8, 9

Moderately large (10 - 16mm in length); spire high (more than ½ total shell length), whorls flat-sided, suture moderately impressed; body whorl fusoid; aperture moderately broad, apertural lip thickened, denticulate interiorly, columella straight and strongly denticulate, siphonal canal short to moderately long, slightly bent; sculpture of numerous prominent axial ribs crossed by weaker spiral grooves; color from straw yellow to chestnut brown with a spiral subsutural row of white spots. Each radular row consists of a flat, subrectangular median tooth flanked on each side by a sigmoid, bicuspid lateral tooth (Figure *33*).

Remarks: The type of *Columbella translirata* was lost, along with the remainder of Ravenel's types, which were reportedly destroyed during the burning of Atlanta, Georgia in the U. S. Civil War.

This species exhibits a cline in shell characters coincident with apparent tropical submergence from north to south along the Atlantic coast of the United States. In the north, where *Costoanachis lafresnayi* may be collected in moderately shallow water, the shell is relatively broad with a moderately acute apical angle and a very short siphonal canal. Southward, this species inhabits progressively deeper water, to 36m or more. Here the shell is lighter-colored and more slender, with a more acute apical angle and a somewhat longer siphonal canal.

Examples of this species are known from the Pliocene of Florida and are otherwise known only from the Recent.

Range: Grand Manan Island, New Brunswick, Canada to Key West, Florida and Yucatán, Mexico; occasional specimens from Barbados, West Indies.

Costoanachis hotessieriana (Orbigny, 1842)

(Figures *4*, *8*, *9*)

Columbella hotessieriana Orbigny, 1842. *in* Sagra, Hist. Phys. Polit. Nat. Cuba. Atlas, plt. XXI, figs. 37-39 (Guadeloupe; lectotype, BM[NH] 1854.10.4.359; paralectotype BM[NH] 1854.10.4.359/1)

Columbella guildingi Sowerby, 1844. Proc. Zool. Soc. London 12: 53 (St. Vincent, B. W. I.; holotype, BM[NH] 1966. 448)

Columbella hotessieri Orbigny, 1845. (*in* Sagra), Hist. Fis. Polit. Nat. Cuba. Text, p. 234

Anachis mcgintyi Usticke, 1959. Checklist mar. shells St. Croix, p. 67; plt. III, fig. 15 (St. Croix, Virgin Islands; holotype, Usticke Coll.)

Shell small (6. 0- 7.5mm in length); spire moderately high (about ½ total shell length) and acute, whorls convex, suture impressed; body whorl subcylindrical, apertural lip moderately thickened, denticulate interiorly, columella straight, weakly denticulate, siphonal canal short to moderate in length, slightly bent, anal sinus barely discernible; sculpture of axial ribs crossed by shallow, closely-spaced spiral grooves which become crowded just below the suture; color pattern varying from chocolate brown to light tan with a spiral band of white spots of varying width just above the suture. Each radular row consists of a flat, subrectangular median tooth flanked on each side by a sigmoid, tricuspid lateral tooth (Figure *34*).

Remarks: First named *Columbella hotessieriana* by Orbigny (1842), this species had its name emended to *C. hotessieri* without explanation by the same author (1845) in subsequent editions of the same work.

Costoanachis scutulata (Reeve, 1859)

(Figure *11*)

Columbella scutulata Reeve, 1859. Conch. Icon. *Columbella*. pl. XXX, spec. 191 (here restricted to Hamilton Harbor, Bermuda; holotype, BM[NH] 1966.48.6)

Columbella (Seminella) catenata Tryon, 1883 (not Sowerby, 1844). Man. Conch. 5: 179; pl. 58, figs. 51-55

Shell moderate in size (7 - 10mm in length); spire slightly less than ½ shell length, whorls slightly convex, shouldered, suture impressed; body whorl cylindrical, aperture moderately broad, apertural lip denticulate interiorly, columella slightly bent, weakly denticulate, siphonal canal very short, anal sinus distinct; sculpture cancellate on first 2 postnuclear whorls, spiral sculpture almost completely

obsolete on later whorls where low axial ribs predominate. A single spiral subsutural groove persists to the most recently formed whorl; ground color from light brown to purple black with spiral rows of irregular white blotches below and above the suture. Each radular row consists of a flat, subrectangular median tooth flanked on each side by a bi- or tricuspid sigmoid lateral tooth (Figure *36*).

Remarks: The validity of this species has been in doubt ever since Reeve's original description as a result of his poor figure and his failure to give a type locality. There is little doubt in my mind, after having examined a photograph of the holotype in the British Museum (Natural History), that this name must be applied to a small, somewhat variable species from Bermuda.

Although often considered a variety of *Anachis sparsa* Reeve, 1859, a species with a much greater geographic range, *Costoanachis scutulata* differs from that species in the general appearance of its aperture (especially its distinct anal sinus), its lower, less prominent sculpture, its unusual subsutural groove, its distinctive color pattern, and in minor radular distinctions. Furthermore, *A. sparsa* and *C. scutulata*, although occurring together in several Bermudan localities, have remained distinct, thus apparently ruling out the possibility of interbreeding.

No fossil examples of this species have been reported.

Range: Apparently endemic to the Bermuda Islands.

Costoanachis semiplicata (Stearns, 1873)

(Figure *14*)

Anachis semiplicata Stearns, 1873. Proc. Acad. Nat. Sci. Philadelphia 25: 344 (Tampa Bay, Florida; lectotype, US NM 54275)

Anachis avara Tryon, 1883 (not Say, 1822). Man. Conch. 5: 159; plt. 55, fig. 68 only

Shell small to moderate in size (8 - 15 mm in length); spire slightly more than ½ shell length, whorls almost flat-sided, suture shallow; body whorl narrow, aperture moderately wide, apertural lip slightly thickened, distinctly denticulate within, columella straight, weakly denticulate; sculpture of a few widely spaced low axial ribs limited to the body whorl, all spire whorls smooth, colored light green or yellow-grey. Each radular row consists of a flat, rectangular median tooth flanked on each side by a sigmoid, distally bicuspid lateral tooth (Figure *37*).

Remarks: This species has been considered a variety or subspecies of *Anachis avara*, a species that occurs on the east coast of the United States as far south as Matecumbe Key, Florida, whereas *Costoanachis semiplicata* occurs in the Gulf of Mexico and on the west coast of Florida south to Cape Romano. Several shell differences and certain minor radular distinctions serve to differentiate these 2 species. *Costoanachis semiplicata* has a longer, narrower shell form, with fewer, more widely spaced axial ribs than those of *A. avara*. Another form of *C. semiplicata* from the Gulf of Mexico has many, more closely spaced axial ribs. This form has often been called *A. similis* Ravenel, 1861, a name of dubious identity as it was never figured by its author, and its holotype, along with the rest of Ravenel's types was presumably destroyed during the U. S. Civil War.

No fossil examples of this species have been reported.

Range: Boca Grande, southwestern Florida, along the shores of the Gulf of Mexico to Progreso, Yucatán, Mexico.

Costoanachis sertulariarum (Orbigny, 1839)

(Figure *13*)

Buccinum sertulariarum Orbigny, 1839. Voy. Amér. Mérid., Atlas, plt. 61, figs. 13-17 (La Baie de San Blas, Patagonie; holotype, BM[NH] 1854.12.4.451)

Columbella sertulariarum Orbigny, 1841. Voy. Amér. Mérid., text: 431

Columbella avara Kobelt, 1874 (not Say, 1822). Nachr. Malac. Gesell.: 59

Columbella brasiliana Martens, 1897. Arch. Naturgesch. 1 (2): 171-172; plt. 16, fig. 10 (Desterro, Brasil; holotype, BM)

Moderate in size (9 - 12 mm in length); spire about ½ shell length, acute, whorls flat-sided, suture shallow; body whorl cylindrical, aperture moderately wide, interior of

Explanation of Figures *29* to *37*

Figure *29*: *Anachis scalarina* – radular dentition
Figure *30*: *Anachis lyrata* – radular dentition
Figure *31*: *Costoanachis avara* – radular dentition
Figure *32*: *Costoanachis fenneli* – radular dentition
Figure *33*: *Costoanachis lafresnayi* – radular dentition
Figure *34*: *Costoanachis hotessieriana* – radular dentition
Figure *35*: *Costoanachis floridana* – radular dentition
Figure *36*: *Costoanachis scutulata* – radular dentition
Figure *37*: *Costoanachis semiplicata* – radular dentition

Figure 29

Figure 30

Figure 31

Figure 32

Figure 33

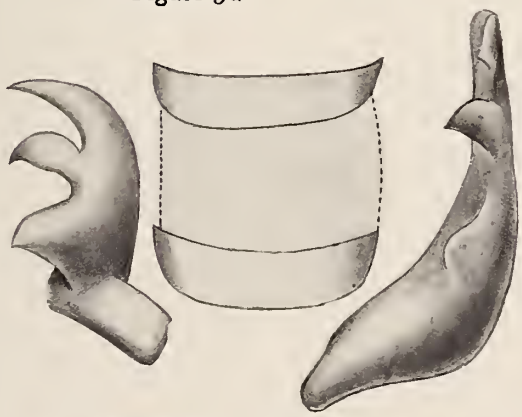

Figure 34

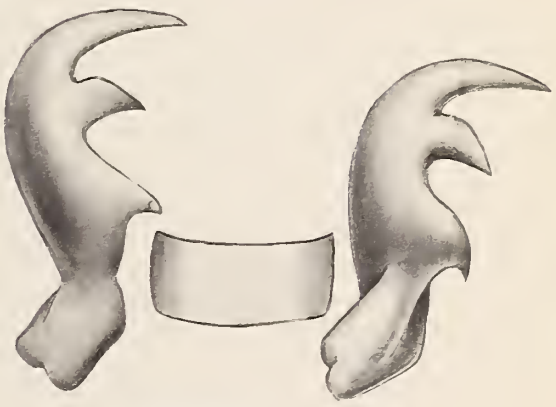

Figure 35

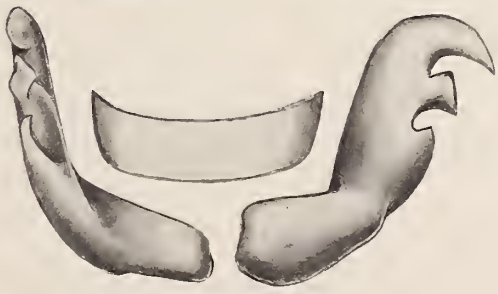

Figure 36

Figure 37

apertural lip denticulate, columella non-denticulate, slightly bent anteriorly; sculpture of sharp axial ribs with microscopic spiral scratches between them limited to the body whorl. Color off-white with random fine brown punctations and larger purple-brown blotches. Each radular row consists of a flat subrectangular median tooth, flanked on each side by a sigmoid lateral tooth with 2 sharp distal cusps and a more rounded proximal projection (Figure *39*).

Remarks: The only specimen of *Costoanachis sertulariarum* from the Orbigny collection in the British Museum (Natural History) is considered the holotype. It must be noted here that the dimensions of the BM(NH) specimen are significantly greater than those given by Orbigny and the type locality is considerably further south than any locality record in the collections examined.

Misidentification of this species is almost certainly responsible for the periodic assertions that *Anachis avara* Say occurs on the Atlantic coast of south-central South America (Kobelt, 1874; Pilsbry, 1898; Eyerdam, 1950; Parodiz, 1962). Although these species are similar in general form, the spire whorls of *Costoanachis sertulariarum* are less convex, its axial ribs are more poorly defined, its columella is not denticulate as in *A. avara*, and there are minor differences in color pattern and radular morphology.

Marcus & Marcus (1962) have described and figured the anatomical features of *Anachis brasiliana* von Martens, a synonym of *Costoanachis sertulariarum*. According to them Orbigny's species has a wider distribution, a larger shell and slightly different body coloration. Although these assertions may have a bearing on the discrepancy between Orbigny's type and other specimens we have seen, the fact is that we have seen no other specimens that agree in size and locale with the type. Unfortunately no living specimens of this species have been available for examination.

There appears to be a close relationship between this species and *Costoanachis floridana* (Rehder, 1939). The primary differences are that *C. floridana* is, on the average, significantly smaller and has a broader apical angle and heavier body whorl, both of which impart a stouter appearance to it. The ranges of the 2 (*C. floridana* – east coast of the United States from North Carolina to southern Florida and on the Texas coast; *C. sertulariarum* – northern Brazil to southern Argentina) do not overlap to my knowledge.

No fossil examples of this species have been reported.

Range: East coast of South America from Rio Grande do Norte, Brazil to Mar del Plata, Argentina.

Costoanachis sparsa (Reeve, 1859)

(Figure *10*)

Columbella sparsa Reeve, 1859. Conch. Icon. *Columbella*, plt. 31, figs. 200a, 200b (here restricted to St. Thomas, Virgin Islands; holotype, BM[NH] 1966484)
Columbella (Seminella) catenata Tryon, 1883. (not Sowerby, 1844). Man. Conch. 5: 179; plt. 58, figs. 51-55

Shell moderately large (8 - 11 mm in length); spire moderately high (½ shell length), acute, whorls slightly convex, shouldered suture moderately deep; body whorl fusoid, aperture narrow, apertural lip slightly thickened, denticulate interiorly, columella straight, denticulate, siphonal canal short, slightly bent, anal sinus present; sculpture of prominent axial ribs with broad spiral grooves strongest between the ribs; color variable, generally with alternating evenly-spaced squares of orange-brown on a white background. Each radular row consists of a flat, rectangular median tooth, flanked on each side by a sigmoid lateral tooth with 2 sharp distal cusps and one blunt proximal projection (Figure *38*).

Remarks: This is the most variable of all the species of *Costoanachis*, with a typical form as described above and other forms varying in shell proportion and color pattern. The sculpture and shouldering of each whorl are, nevertheless, constant throughout the species.

Although confused by many authors with *Costoanachis catenata* and *C. scutulata*, these 3 species are quite distinct. *Costoanachis catenata* has a unique chain-link color pattern and a bulbous, translucent-white protoconch; *C. scutulata* differs consistently from the others in the weakness and limited extent of its sculpture and its prominent anal sinus; the ribs of *C. scutulata* are low, sinuous, often disappearing below the middle of the body whorl. The color pattern of *C. scutulata* also differs markedly from that of *C. sparsa*. Spiral grooves notably present in the latter species are absent in *C. scutulata*.

No fossil examples of this species have been reported.

Range: Bermuda and Lantana, Florida to Venezuela and (possibly) southern Brazil.

Metulella Gabb, 1873

Metulella Gabb, 1873. Proc. Acad. Nat. Sci. Philadelphia 24: 270 (type species by OD, *Metulella fusiformis* Gabb, 1873)

Shell moderately large to large (10 - 25 mm in length); spire high, acute, whorls flat-sided, suture squarely incised; body whorl fusoid, aperture narrow, strongly con-

stricted anteriorly, outer lip slightly thickened, strongly denticulate on its inner surface, columella straight, weakly callused and weakly denticulate, length of siphonal canal moderate to long; sculpture of strong, closely-spaced axial ribs, crossed by moderately strong spiral cords. Color white to yellow-white. Radular dentition unknown.

Remarks: This genus is almost extinct as the number of species has declined from a high of 4 or 5 in the Pliocene to a single living species today. This living representative of an otherwise extinct genus, *Metulella columbellata* (Dall, 1889a), should present a unique opportunity to establish the relationship of *Metulella* to other fossil and Recent columbellid genera. Unfortunately, no live-collected specimens of the species are known.

Metulella columbellata (Dall, 1889)

(Figure *19*)

Metulella (Nassarina) columbellata Dall, 1889a. Bull. Mus. Comp. Zool. **18**: 182 (off Cape Catoche, Yucatán. Mexico; holotype, USNM 93019)

Shell moderately large (10 - 15mm in length); spire high, acute, whorls almost flat-sided, suture incised; body whorl fusoid, aperture narrow, strongly constricted anteriorly, outer lip slightly thickened, strongly denticulate on its inner surface, columella straight, weakly denticulate with a thin callus, siphonal canal moderately long; sculpture of strong, closely-spaced axial ribs crossed by moderately strong spiral cords; color white or yellow-white. Radular dentition unknown.

Remarks: This rare species, the only Recent species of *Metulella*, has been encountered more frequently as more deepwater dredging is carried out in the Gulf of Mexico. Unfortunately, the position of *Metulella* must await the description of its anatomy and radular dentition.

The earliest fossil Metulellas are known from the Miocene of the Dominican Republic (*Metulella venusta* Sowerby, *M. williamgabbi* Maury, and *M. fusiformis* Gabb).

Range: Gulf of Mexico (specimens have been seen from Cape Catoche, Yucatán, Mexico – type locality – and off Tampa Bay, Florida.

Nassarina Dall, 1889

Nassaria (Nassarina) Dall, 1889a. Bull. Mus. Comp. Zool. **18**: 182 (type species by OD, *Nassarina bushii* Dall, 1889a)
Pyramimitra (Nassarina) Cossmann, 1901. Essais Paléoconch. Comp. **4**: 128
Nassarina Dall. Woodring, 1928. Carnegie Inst. Wash. Publ. **385**: 279

Shell small (3 - 10mm in length), fusiform; spire moderately high, acute, whorls convex, suture impressed; body whorl approximately ½ of shell length, outer apertural lip denticulate on its inner surface, aperture long, narrow, constricted anteriorly to form a narrow, bent siphonal canal, columella slightly bent anteriorly, its thin, detached callus forming a prominent keel; sculpture of numerous swollen axial ribs crossed by strong spiral cords. Each radular row consists of a flat, subrectangular median tooth flanked on each side by a sigmoid, distally bicuspid lateral tooth. The cusps of the laterals are shorter and less bent than those in many other genera.

Remarks: The shell characters by which this genus may be differentiated from other columbellid genera are: 1) possession of both strong spiral and strong axial sculpture, 2) the constricted and elongate siphonal canal, and 3) the keel formed by a thin detached parietal callus.

The genus *Zanassarina* Pilsbry & Lowe, 1932, includes 9 small eastern Pacific nominal species. It was originally erected as a subgenus of *Nassarina* Dall. No currently known Recent western Atlantic columbellid species are assignable here. Its affinities seem to be closer to *Costoanachis* and *Parvanachis* than to *Nassarina*.

Explanation of Figures *38* to *47*

Figure *38*: *Costoanachis sparsa* – radular dentition
Figure *39*: *Costoanachis sertulariarum* – radular dentition
Figure *40*: *Nassarina bushii* – radular dentition
Figure *41*: *Nassarina glypta* – radular dentition
Figure *42*: *Nassarina metabrunnea* – radular dentition
Figure *43*: *Parvanachis isabellei* – radular dentition
Figure *44*: *Parvanachis obesa* – radular dentition
Figure *45*: *Parvanachis ostreicola* – radular dentition
Figure *46*: *Steironepion minor* – radular dentition
Figure *47*: *Steironepion monilifera* – radular dentition

Figure 38

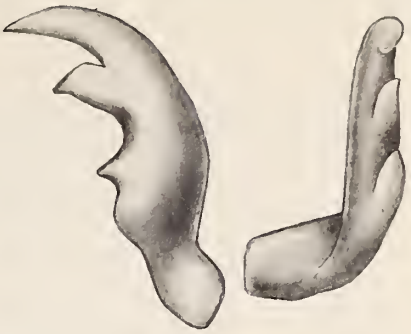

Figure 39

Figure 40

Figure 41

Figure 42

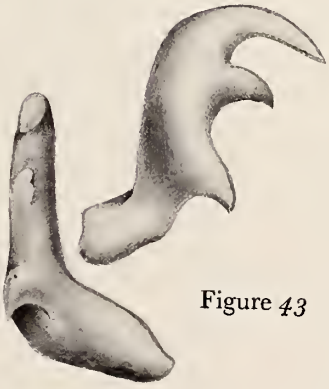

Figure 43

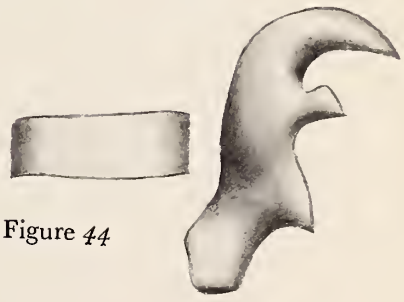

Figure 44

Figure 45

Figure 46

Figure 47